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A DEVICE FOR SAMPLING GRAIN, SEEDS, AND OTHER MATERIAL.

By E. G. Boerner, *Assistant in Grain Standardization.*

INTRODUCTION.

The device described in this bulletin was developed primarily to meet the demands of grain and seed dealers and laboratory workers for securing a reliable sample of grain or seed from a larger portion of the material to be examined, graded, or analyzed. It can also be used for sampling flour, meal, feeds, coal, ore, or any other material of like kind for examination or analysis and to mix or blend and divide two or more streams of unlike material of the kind specified, so that the two resulting streams will be a thorough mixture of the original two or more kinds of material.

Another application of the device which should be of special interest to the grain trade is that a sample can be divided so that one half can be used for testing and grading and the duplicate half either turned over to the seller or to the buyer of the grain or retained for future reference.

Both the construction and the process have been made simple, so that reliable samples can be obtained by any careful worker.

The operation of the device does not require power of any kind, gravity being all that is necessary to make the material pass through it.

DESCRIPTION OF THE SAMPLING DEVICE.

As is shown in figure 1, the device consists of a hopper (*A*), held in position over a cone (*D*), which is provided at its base (*G*) with a series of separated ducts (*F*) having uniform distances or spaces between them (*E*). These ducts are so constructed that they are equal to the width of the spaces between the ducts, as shown in figures 2 and 3. The ducts may be so constructed as to form an integral part of the cone or they may be adjusted to the cone by clamps, rivets, or other satisfactory means. Adjusted to the bottom of the ducts, at *H*, is a funnel (*I*) having a spout (*K*) at its bottom part, as seen in figure 1.

The ducts constitute a passageway from the exterior of the cone to the interior of the funnel, as is shown by the arrows (*M, M*) pointing downward in figure 1. Inclosing this inner funnel is another or outside funnel (*J*), also having a spout (*L*) at its base. The upper portion of the outside funnel extends over the ducts and the base of the cone, so that the enlarged opening of this outside funnel partly

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Note.—This bulletin is of interest to all who have occasion to get samples of grain and seeds.

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circumscribes the cone. As is seen in figure 4, the outside funnel is provided with an aperture (*O*) near its lower end, through which the spout (*K*) from the interior funnel passes. The space between the two funnels directly over the spout from the inside funnel is bridged with an inverted V-shaped bridge (*P*) in order to prevent the lodging of material as it passes through the apparatus.

The outside funnel may be secured to the upper and outside part of the ducts by soldering or riveting, or by any other suitable or convenient means. The outside funnel is a sufficient distance from the inside funnel to allow the material to be sampled to pass freely through the space between the two funnels. The spaces *E* between the ducts at the base of the cone constitute unobstructed passageways from the surface of the cone to the interior of the outside funnel, as is shown by the arrow *N* pointing downward in figure 1. The spaces between the ducts below the base of the cone are closed, so as to prevent any of the material which passes between the two ducts from bounding into the inner funnel as it passes through the device. This is shown by *V* in figures 1 and 2.

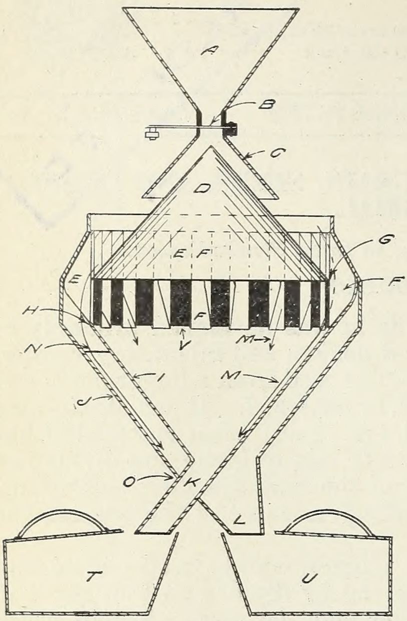

FIG. 1.—A vertical cross section of the sampling device, showing the paths taken by the material in passing from the hopper (*A*) to the receptacles (*T* and *U*).

As seen in figure 4, the device is held in a fixed operative position by means of three supports or legs *Q*, which may rest upon any solid base. The supports are fastened to the outside funnel at two points. They should be so placed that one of them will rest on the floor at a point halfway between the two receptacles, as is shown in figure 5. The hopper at the top of the device is held in position by three supports *R*, which are soldered or riveted to the hopper and bolted to the inside rim of the outside funnel along its upper edge, each support being fastened at a point *S* opposite to the upper part of the three lower supports or legs. The hopper is so placed that the peak of the cone is directly under the center of the opening at the bottom part of the hopper, so that the material in passing through the device will spread evenly on all sides of the cone.

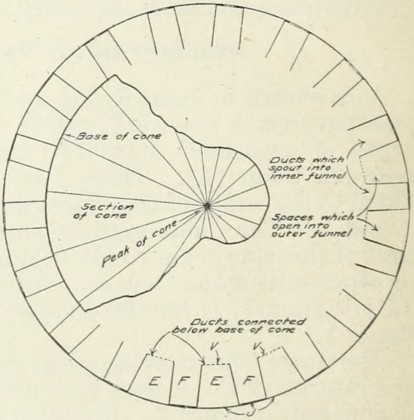
Base of cone
Ducts which spout into inner funnel
Section of cone
Spaces which open into outer funnel
Peak of cone
Ducts connected below base of cone
V
V
E
F
E
F
J

FIG. 2.—Cross section of the sampling device at the base of the cone.

In the opening at the bottom of the hopper the diameter of the short spout directly under the valve (*B*, fig. 1) is slightly larger than the diameter just above the valve, so as to prevent small seeds, dirt, etc., from being forced into the slot in which the valve fits when it is closed. Fastened to the short spout at the lower part of the hopper is a shield (*C*, fig. 1), which extends part way down over the cone. This shield prevents the material from bounding out of the apparatus as it falls on the cone from the hopper.

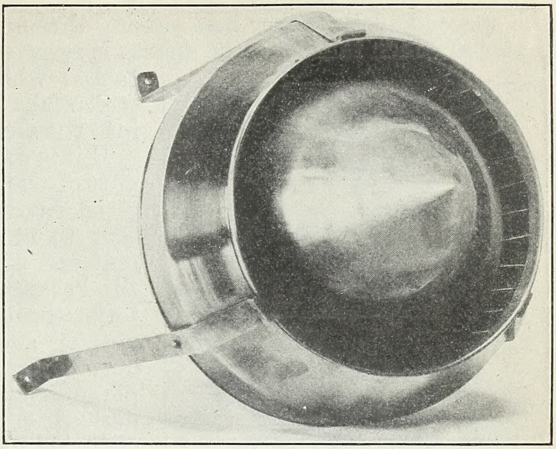

Fig. 3.—Top view of the sampling device with the hopper removed, showing the upper part of the ducts around the base of the cone.

The apparatus described may be constructed from any material which is sufficiently strong and durable to withstand the strain of the operation to which it may be subjected in effecting the sampling, mixing, or blending of the material specified. When used for grain, seeds, or ground material, it can be made of brass or a good grade of zinc, both of which metals are fairly rust resistant.

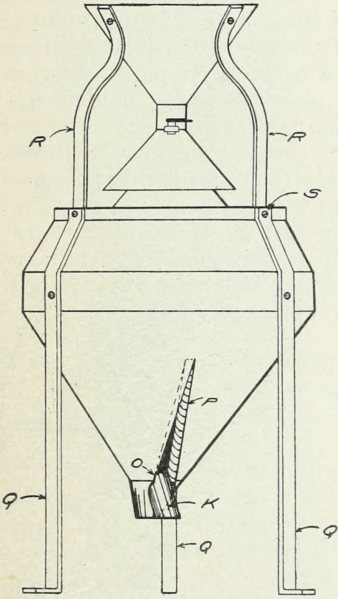

Fig. 4.—Diagrammatic view of the sampling device, showing how the spout (*K*) from the inside funnel passes through the outside funnel.

OPERATION OF THE SAMPLING DEVICE.

Place the material to be separated in the hopper and open the valve or gate, which allows the material to fall on the peak of the cone in the form of a circular column. The material then spreads on the cone into a line the length of the circumference of the cone at its base, where it is divided into sections by the ducts and the spaces. The material entering the ducts passes through them and falls into the inner funnel and finds an exit through the spout at its bottom, falling into the receptacle (*T*, fig. 1), which is placed underneath the spout for receiving the material.

All of the material which enters the spaces between the ducts at the base of the cone falls into the outer funnel and is spouted into the second container (*U*), which is placed below the spout for that purpose. A top-surface view of the receptacles is shown in figure 6.

As the widths of the ducts are equal to the widths of the spaces between the ducts, it follows that the material falling on the cone is separated into approximately equal parts, one-half passing through the spaces and the other half passing through the ducts. All of the material which falls into the spaces is spouted into one of the receptacles, while all of the material which falls into the ducts is spouted into the second receptacle.

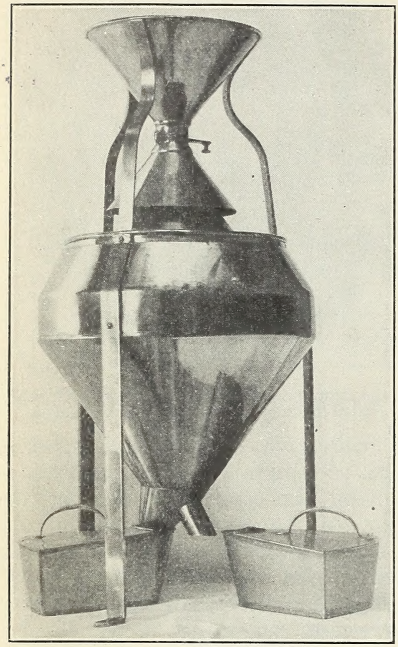

FIG. 5.—Side view of the sampling device, showing one leg placed on the left side halfway between the two receptacles.

If it is desired to obtain a smaller part of the original amount of material than one-half, it is only necessary to return to the hopper the material which falls into either of the receptacles and run such material through the device again, repeating such action as often as it may be necessary to procure a sample sufficiently small for the purpose desired; or the same result may be obtained by building up a series of superimposed devices of the kind described, so that the lower device will receive only the material which is spouted from one of the funnels.

If it is desired to obtain a small sample from a very large quantity of material, as, for instance, from either a carload or cargo of grain, as the grain is being loaded into or discharged from a car or vessel, then the construction of the device can be altered by widening the space between the ducts so that any fraction of the material entering the hopper can be made to pass into the ducts and inner funnel, and by superimposing two or more devices, one above the other, the portion taken out by the ducts in each device will reduce the original material very rapidly to a sample of any size required.

The device can also be used for blending two or more streams of wheat or other grain going to the rolls of a mill or mills. If it is used to blend two or more streams of (say) wheat of different varieties or grades, it is only necessary to spout each stream into the hopper and to bring the two resulting streams together again before the mixture enters the rolls of the mill. To supply two sets of rolls with the same blend, each stream as it leaves the device should be run to a separate set of rolls. If it is desired to run the blend to four sets of rolls, then it would be necessary to place another device under each spout of the upper device and run the grain from each of the four resulting streams to a separate set of rolls.

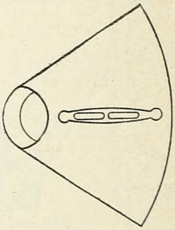

FIG. 6.—Top view of one of the receptacles into which the material to be sampled is spouted.

NOTE.—Application has been made for a patent covering this device; if patent is allowed it will be donated to the people of the United States.

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